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Environmental benefits and its statement in the environmental management accounting

Ph.D. Dissertation

Theses

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University of Szeged
Faculty of Economics and Business Administration
Doctoral School in Economics

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1. Subject relevance and importance

Sustainability and sustainable developments become widely known as a result of the Brundtland report (1987). Nowadays it has been one of the most used ideas of the economic and the academic life. The idea of sustainability appeared in specific form among the economy actors, mostly corporations, who increasingly integrate environmental issues in the everyday business practice (Berry–Rondinelli 1998) due to the fact, that environmental impacts influence their enterprise activities.

The companies with high environmental activity aim not only to fulfil the obligation of legal requirements, but also utilise the advantages of "the greening" (Prakash 2001). Concerning environmental issues, strict liability is a significant aspect as a company has to take responsibility for its caused damages. The responsibility is independent of the background of the damage. Additionally, major multinational companies many times require the adaptation of voluntary environmental management system or other requirements for potential partners before selecting them as suppliers. This expectation impacts the supplier's revenue generation potential. Therefore the social expectation from businesses changed in the last twenty years. The environmental awareness can mean competitive advantages in business practice. To make that transparent, environmental accounting can be one of the good tools to achieve these goals in practise.

The connection between environment and accounting becomes significant driven by new business challenges. The environmental and social side of business activities are increasingly important part of annual financial reports, which means the problem of measuring and measurability (Cormier–Gordon 2001). According to the Hungarian accounting act, the aim of the accounting system is to ensure responsible and real "picture" of the company. In this "picture" the environmental information is relevant too. In connection with environment and accounting, the company success today is determined by the availability of information of stakeholders. Environmental problems in the social judgement are more and more essential. Treating environmental problems can be reflected in the environmental, financial or accounting regulation of the company.

In the traditional accounting system environmental protection associates with the concept of "costs and expenditure" without relating to "return, profit, and savings". Therefore environmental protection and company value creation are not positively correlating. On this basis, the interpretation of the environmental protection is obligation rather than an internal need (Walley–Whitehead 1994). Oppositing to this idea, some research supports that

environmental protection establish positive synergies among environmental protection, competitiveness, company value and long operation (Pataki et al. 2003, Schaltegger–Burritt 2010).

In the traditional accounting system environmental activity is appeared first in the cost statement. The environmental accounting system complements the contemporary accounting, accordingly the emphasis is on the **environmental costs**. The literature says that the environmental benefits was captured a few times, but not in a comprehensive way (Schaltegger–Burritt 2010). As the environmental management accounting system has only verifiable results in the long run, therefore companies question the necessity of such a new accounting reporting system. For companies to realize the advantages of a new reporting system, not only the environmental costs are to be taken into account, but also the environmental benefits as well. In competitive environment, only actions and investment with justified economical results can be initiated, therefore the environmental benefits are important, non-negligible elements. With such a new reporting system not only benefits can be materialized, but also additional environmentally sensitive activities can be encouraged.

Annual reports reflect on the importance of the environmental benefits, where the environmental cost savings of environmental activities are strongly emphasized. The environmental cost savings are one part of environmental benefits (EPA 2000, EU Commission 2008, WWF 2010). The measuring the environmental benefits are ad hoc in most cases, while they play important role in investment and return calculations.

2. Research objectives

Accounting has to face with the challenges driven by the increased focus on sustainability. The environmental accounting can present a good solution, because its objective is to show the real "picture" from the financial side. Environmental accounting contains the statement of environmental investment, environmental cost, expenditures and benefits. This information is important in the business decision making processes (Csutora 2001). The environmental accounting system has to concentrate on not only the environmental costs, but also the environmental benefits.

The objective of the dissertation is to analyse the environmental benefits from the business point of view staying on the company level. The study concentrates on the

management environmental accounting emphasising the environmental cost calculations and environmental benefits. The dissertation has **two main research questions**:

- How environmental benefits can be reported? What tools can be used to calculate them?
- Is it possible to establish model to measure internal business benefits related to environmental activities?

The first research question is addressed by an in-depth literature review and analysis on the field of accounting theory, which results in confirming two theses detailed in the last chapter.

I develop a model to capture environmental benefits, which answer the second research question. Two hypotheses are examined in the empirical study with relation the second research question:

1. **Hypothesis:** The new model measuring the environmental benefits can be utilised in business practice providing comprehensive financial results.
2. **Hypothesis**: The new model measuring the environmental benefits complements the management accounting system with information influencing the company operation.

3. The structure of the dissertation

The dissertation consists of three main parts containing six chapters. In the **first part** (2–4. chapters) the formulation of the concept, the development tendency and the most important notions are reviewed. The environmental accounting originates from the social accounting. Nowadays it complements the traditional accounting system with environmental information. In this context it is interesting to analyse the connection between the traditional and environmental accounting. The environmental management accounting system contains of the system of environmental costs. I analysed five environmental cost models. Based on the model comparison, I can conclude that these models show environmental costs in full details. The main aim of the analysis of the models was to find a complex and easily applicable model for day-to-day business practices. The model, most suitable to meet these criteria is the one developed by Japanese Environmental Ministry which is used as a basis for the calculation of environmental cost in the empirical analysis.

The **second part** (5. chapter) focuses on the systematization and measuring methodology of environmental benefits, which is a key part of the study. Environmental

benefits have positive effects on the environmental business activities through either the internal business processes or the outside environment and stakeholders. I concentrate on the inner category analysing the micro business processes, the outside elements are not included in the accounting system, and therefore, I exclude them. The definition used in this dissertation is the following: **environmental benefits originate from those actions, which have positive impacts on the financial processes and have relation to the environmental protection**. The material and immaterial elements are reviewed in this study, but the measurement of the immaterial ones is not included. The main aim is to set a new, practical implementable model of environmental benefits.

The **third part** (6. chapter) concentrates on how to apply the environmental cost and benefit report in business operation. The methodology I use is the case study evaluation. This method is most suitable to analyse the practical side of the model.

The case study examines an automotive manufacturer company, which pays attention for the environmental guidelines. I analyse the environmental actions and investments, and determine the environmental costs and benefits too. I analyse the environmental cost with Japan model, while I use my own, recommended method to analyse environmental benefits.

4. Theoretical background

The history of the environmental accounting originates from social accounting. S**ocial accounting** is a communication process, which reports the social and environmental effects of business activities. The main emphasis is on the business transparency (Brown et al. 2006). **Environmental accounting** is a practice, which aim is to demonstrate the financial or physical effects on the environment or conversely the environment on the company (Schaltegger–Burritt 2010).

The literature differentiates five **development phases of social accounting** (Mathews 1997, Gray et al. 2008):

- The beginning: the increased awareness of social accounting begun in 1960 (Gray 2002, Dillard et al. 2005). The main focus is on the ethical base of a company, corporate responsibility and ecological problems (Loew et al. 2004).
- Initiation: the interest of the new topic increased in 1970, but there was declined with the questioning of the role of accounting in the area of environmental disclosure.

- New wave: in the 1980s the environmental disasters (for example Exxon Valdez [1]) increased the attention of the environmental accounting, because the environmental effect of business generated global problems. Intensive development follows the appearance of the new special accounting journals. The environmental accounting was than separated from social accounting in this period.
- Maturation: in 1990s the importance of environmental accounting increased and became a significant research area.
- Nowadays, environmental accounting can help to measure environmental performance. The demand to analyse, measure of environmental cost and benefits has been increasingly intensified.

4.1 The environmental costs

Similarly to the conventional accounting system, environmental accounting system contents **environmental management and financial accounting** too. The aim of the environmental management accounting is to inform the stakeholders about the company operations, while the financial management accounting reports to external stakeholders (Schaltegger et al. 2000). The dissertation emphasises the environmental management accounting system within which the environmental costs and benefits are highlighted. The **environmental costs** are stated in connection with the environmental protection and environmental damages. Environmental costs include the cost of prevention and reduction of environmental damages, waste treatment, monitoring and the cost of restoration (Jasch 2003). The most important environmental cost measuring models are outlined as a part of the literature overview which contains the following models:

- Model of EPA (EPA 1995) established by the Environmental Protection Agency.
- Model of Stefan Schaltegger and Roger Burritt (Schaltegger–Burritt 2000).
- Model of UNDSD (UNDSD 2001). It is developed by United Nations Division for Sustainable Development.
- Model of IFAC (IFAC 2005). International Federation of Accountants worked out this model, which is the improvement of the model of UNDSD.
- Model of Japan (Ministry of the Environment Japan 2005).

[1] Exxon Valdez was on oil tanker crashed in 1989. The cost of restoration was about 15 billion dollars (Schaltegger–Burritt 2005).

The main difference is in the **background of the models**. The basic of EPA Model is a traditional accounting system, which integrates the immaterial elements. The Model of Schaltegger–Burritt is based on the basics of sustainability, where the use of environmental capital means environmental cost. The Model of UNDSD and IFAC were found on material flow, while the Model of Japan bases on the business activities. The background concepts define the used categories of cost. The Model of Japan can be regarded as the most detailed and polished model, which is used in real business life in Japan. The model embraces the whole business process with a system approach. It is closely connected with the activity based costing approach. These are the main aspects which drove me to use this model as a base of the empirical analysis.

The models of environmental cost respect the environmental benefits, but not in a clear way. The Model of EPA does not handle the environmental benefits separately, based on which important investment decisions are made. The Model of Schaltegger–Burritt differentiates the direct and indirect environmental benefits. The Model of UNDSD/IFAC distinguishes the real and intangible environmental benefits. The Model of Japan does not use the immaterial elements, but considers the real benefits and cost savings as environmental benefits. After the literature review the definition of environmental cost can be well established, but the area of environmental benefits was found to be incomplete. This is the basis of the new method to measuring environmental benefits.

4.2 The environmental benefits

The basic concept of the new model is built on the shareholder value model of Rappaport (1998). This model is a valuation process that aims to measure the company value in respect of the stakeholders. The value of the company is determined from the next value drivers:

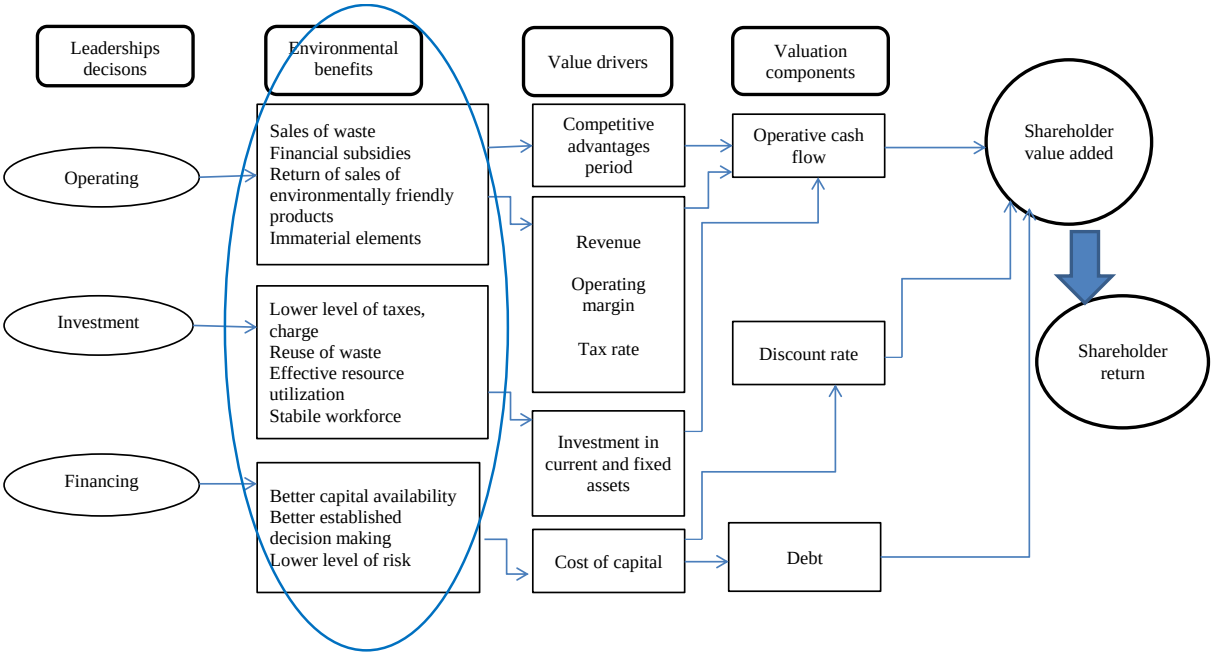
- competitive advantage period,
- revenue,
- operating margin,
- tax rate,
- investment in current and fixed assets, and
- cost of capital.

The concept is built on accounting basis and operates with free cash flow (Figge–Schaltegger 2000, Copeland et al. 1993). The environmental activities of the company have effect on the value drivers. So this is a suitable concept to measure environmental benefits.

The **main idea of the new model** is that the leadership decisions affect the environmental benefits and therefore they influence the shareholder value through value drivers. The next categories are determined in the new model (figure 1):

- operating environmental benefits,
- investment environmental benefits and
- financing environmental benefits.

Figure 1 The connection between the environmental benefits and shareholder value concept



Source: own construction based on Rappaport (1998)

The **operating environmental benefits** contain the benefits from the reorganisation of company processes impacting the revenues increase, the cost decrease and the tax rate. The **investment environmental benefits** originate from investment in assets or in human workforce. The **financing environmental benefits** have positive effects on cost of capital.

5. The method of the analysis

The methodology of the dissertation in the first logical part is descriptive using the academic literature review. In the second part the empirical analysis bases on **case study method**. In the empirical study I use the Model of Japan to analyse the environmental costs and the self-constructed model to evaluate the environmental benefits.

I analyse an automotive manufacturer company, where I measure the environmental costs and benefits. This company pays attention to the environmental protection aspects, so these activities provide construe field. The period analysed is from 2001 to 2008. The first sustainability report appeared in 2001; in this year the production got balanced. In 2008 the company had to introduce production restrictive arrangements because of the economic crisis. In addition I have data until 2008 too.

The examination bases on the analysis of documents, and on the reconciliations with the company in the case of data failure. I use the sustainability reports from 2001 to 2008 and financial statements too.

The main aim of the case study is to examine the new model applicability in business area and the relevance of the received information. The analysis of both the environmental benefits and costs give suitable basis for other evaluation.

6. The new results of the dissertation, theses

The results of the dissertation are the new measuring model of the environmental benefits, and the theses. The review begins with the model disclosure.

6.1 The new model of environmental benefits

The new measuring model of environmental benefits is able to determine and measure the environmental benefits internally of a company (table 1). The model evaluates the operational, investment and financing related environmental benefits.

The **operational environmental benefits** contain the benefits from the reorganisation of company processes, and have effects on revenues increase, the cost decrease and the tax rate. The revenues of sales can increase when the usefulness of the product or service can increase. The sales revenues of environmentally friendly products are in this category. These effects depend on the image of the company or the environment awareness of customers. The sales revenue can derive from the sales of waste or the sales of free capacity of waste treatment plan.

Beyond real revenues, intangible elements can increase environmental benefits. The symbolic awards can improve the reputation of the company or the relationship with customers. The result of this process can be higher level of trust of the company, which can impact the revenue as well. The financial subsidies for environmental activities can increase the revenues, which belong to this group.

Table 1 The categorization of environmental benefits

Environmental benefits	**Material**	**Immaterial**
Operating	Waste related to Sales	Symbolic awards
	Financial subsidies	Received marketing advantages
	Sales of environmentally friendly products	Avoided disasters
	Sales of free capacity of waste treatment plan	Green image
	Cost savings of waste treatment	Better reputation
		Fair valuation
		Better relationship with customers
		Better relationship with authorities
		Better relationship with competitors
		Better reliability
Investment	Lower level of environmental taxes, charges	Better working conditions
	Lower level of environmental provisions	Healthier workforce
	Lower level of insurance	
	Reuse of manufacturing output	
	Environmental research and development	
	Effective resource utilization	
	Stabile workforce	
Financing	Ethical funds	Better established decision making
	Better capital availability	Environment integrated system introduce
		Lower level of risk

Source: own construction

The other part of operational environmental benefits originates from costs savings. This means cost reduction related to waste treatment driven by technology innovation. The immaterial elements are important and placed into this group. The symbolic awards in connection with the free advertisement can mean cost savings. The good social relationship and strong appreciation can prevent cost of advertising and licensing. The value of intangible

elements is only estimated in the calculations. The traditional accounting and environmental accounting system do not include and detail these elements, so I ignore this category.

The last component of operational environmental benefits is the tax rate. The environmental activities are not directly connected to the taxation. But other charges and their savings are influenced by this component.

The **investment environmental benefits** originate from investment in assets or in human workforce. These investments have long run effect on the operation of the company. The aim of investments can be the current or fixed assets.

In the traditional approach the investment in fixed assets (for example cleaning machine) decreases the shareholder value. An investment can increase the shareholder value if the generated return is higher than the costs. The capital intensive investment needs high initial capital, and does not generate enough return (for example end of pipe technology) (Schaltegger–Burritt 2000, Schaltegger–Wagner 2006). So the investment in fixed assets does not create environmental benefits. But the capital intensive investments can be important in the long run business operation, so they are not negligible.

The investments in current assets have effects on the shareholder value (for example effective resource utilization action or reduction in cost of stock or production instruments). If the productivity increases the effective resource utilisation, that can intensify the economic performance. The effective resource utilization effects on the costs of stock and on the pricing processes. The environmental research and development are in connection with the investment environmental benefits.

The investments in human workforce can mean training cost reduction. If the fluctuation is small, it is not necessary to train the new human workforce, so it is possible to reduce costs.

The **financing environmental benefits** have positive effects on cost of capital. The environmental and social actions have effects on the cost of capital. A lot of banks do not deal with the environmental risk. The environmental obligations can increase with environmental acts, which have effects on the risk of credit. The banks can differentiate the companies on the basis of environmental risk. This regulation has effect on the cost of capital. Nowadays banks exist, where the client chooses the company or sector, which get credit. Banks with strong

ethical thought pay attention to the sustainable development, renewable energy sources.[2] With better environmental performance can obtain better credit conditions (Schaltegger–Wagner 2006). Furthermore, governments work out encouragement systems to support companies (for example green public procurement).[3]

6.2 Theses

The aim of the dissertation was the analysis of environmental benefits. Two research questions were formulated. One of them was how environmental benefits can be reported and what tools can be used to calculate them. The other was whether it is possible or not to establish a company's useable model to measuring environmental benefits?

The dissertation includes four theses with theoretical basis. The first and the second theses are in connection with the first research question. The third and fourth theses deal with the new model of environmental benefits and the second research question. With the relation of the second research question I used empirical analysis. I tested two hypotheses and formulated further two theses in this context. In the beginning I discuss the theoretical theses.

1. **Thesis:** The environmental accounting has important role in measuring environmental cost and benefits. It is possible to make more established decision in connection with environmental investment based on an extended data base with the environmental benefits considered.

The environmental costs are the main research area of environmental accounting. The measurement of environmental benefits is important too, because the environmental activity of companies can be stimulated.

2. **Thesis:** The environmental benefits are hidden in the traditional accounting system, so this is necessary to collect these separately. The new model has to provide the foundation to that in details, while the whole company has to embrace the framework.

The environmental costs and benefits are calculated in an ad hoc manner in investment decisions process in most cases. In the traditional accounting system both the environmental cost and benefits are hidden. In business practice, the international used models of environmental cost respect the environmental benefits too. The theoretical environmental benefits models do not consider the overall company operation and therefore, they are not

[2] See ethical banks: Scheire–Maertelaere 2009, de Clerck 2010.
[33] See green public procurement: Michelsen–de Boer 2009, Uttam et al. 2012.

useful in practice. This is the main reason why it is important to collect them in the new method as the environmental benefits.

3. **Thesis:** It is possible to develop a new model of environmental benefits.

The shareholder value model of Rappaport is a good base of the new model. Rappaport's approach uses accounting basis and evaluates with free cash flow. According to the model of Rappaport, processes are categorized the leadership decisions to operating, investment and financing groups. These groups influence the shareholder value through value drivers. The environmental activities have effects on the shareholder value. For example the quality of the product has effect on the value drivers, so the environmental friendly products have similar effects. The environmental benefits take place between the leadership decisions and value drivers. With this method the environmental benefits became measurable.

4. **Thesis:** Collecting the operating, investment and financing environmental benefits can provide broader database supporting the decision making process. The new model is applicable in the traditional and environmental accounting system.

In the new model the environmental benefits are systematized into three categories (see in 6.1 chapters). The use of the model ensures to gain information, which influences the leadership decisions. The new model fits to the traditional accounting system, to the balance sheet and financial statement. This information is hidden in a lot of cases, and the main aim of environmental accounting is to resolve this problem. The new model uses the traditional accounting tools. The environmental benefits are in connection with the environmental value drivers. These environmental value drivers are in direct connection with environmental activity of companies.

After this I examine the results of testing of hypotheses and the thesis of empirical analysis. In the empirical analysis I tested the practical usability of the new model. I examine two hypotheses:

1. **Hypothesis:** The new model measuring environmental benefits is applicable in business practice providing comprehensive results.
2. **Hypothesis:** The new model measuring environmental benefits complements the management accounting system with information, which influences the operational processes of companies.

I accepted the firs hypothesis based on the findings in the case study. In connection with the first hypothesis I formulate the next thesis.

5. **Thesis:** The new model measuring environmental benefits is applicable in business practices. The model depends extremely on the availability of the data.

The model is suitable to measure the environmental benefits in practice. The availability of data and the specification of statement determine the applicability. I made this analysis as independent researcher, but an employee can make an elaborated study.

The second hypothesis is accepted, and in connection to that I formulate the last thesis.

6. **Thesis:** The new model fits to the accounting system and gives a more comprehensive data base to decision making.

The new model operates with the traditional accounting tools and new methods. The results of the model give outcomes, which can influence the decision making processes potentially. However this area needs development in the framework of the model. The future task can be to eliminate the inadequacy of the model and to help the adaptation of companies and the utilization of the results.

The **importance of the dissertation** is that it is unique concerning analysing environmental benefits. The measurement of environmental cost is known and used in international practice. This dissertation can contribute to the practical side of environmental accounting.

This analysis cannot be considered to be fully complete as there are **further research direction**s to be investigated. The incompleteness of the model or the result utilization in the decision making process offer good further discussion opportunities. I also intend to test the model with other company or other industry. The technical or human requirements of the model adaptation are also among the unrevealed interesting questions.

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